**A Behavioral Analysis of Chained and Unchained Sled Dogs**

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**Abstract**

 Modern domesticated dogs are selectively bred to fill several human needs, from companion to working animals such as sled dogs. Federal regulations Concerning the living spaces and care varies between countries, and there is some disagreement on how these animals may be housed, like being chained or unchained. According to the Animal Welfare Act in the Unites States, it is acceptable to keep dogs may on chains, providing opportunities to comparatively test behaviors of chained and unchained high-energy sled dogs. My methods will mostly involve two chosen kennels in Minnesota; one kennel houses 36 sled dogs (n=36) that live in pens without chains, the other houses sled dogs (n=113) kept on chains. Four dogs from each kennel will be observed in their housing to see if there is a statistically significant difference (p<0.05) in the number of displayed negative behaviors. The anticipated result is that this significant difference will be observed in negative and stress behaviors. The study can be used in future to create new legislature for animal welfare laws on federal, state, and local levels and as a model for future eco-tourism kennels.

**Introduction**

Existing methods by humansto capture, house, and domesticate animals vary (USDA, 2013). There are contrasting views on the proper method to house and care for these dogs, altering in moral and practical balances. The major concerns include reduction and evasion of harm to themselves, us, or each other (Yeon, et al. 2001). There may be differences in captive behaviors between and within species, depending on the animal instinct. Animal behaviorists experiment and study these behaviors to understand the animals and assist people in working with them (Drickamer, et al. 2002).

*Chained and Unchained Captive Animals*

It was once common practice to use chains as a method of confinement, especially in circuses. The nighttime behaviors of three young female elephants were studied to test if the common method used in zoos and circuses, chaining, is necessary for the health of the animals and their enclosures (Brockett, et al. 1999). It is sometimes considered necessary to chain them to prevent the destruction of their habitats, the changing of the animals’ dominance hierarchy (Drickamer, et al. 2002) when it cannot be observed, and physical injury to the elephants (Roocroft, 1991). It was revealed that the three female elephants were not negatively altered in their behaviors when left unchained at night with no supervision, however (Brockett, et al. 1999). Sheep, pigs, and cattle both exhibit higher rates of stress behaviors when tethered or chained (Schouten, 1991; Watts and Stookey, 2000; Welmelsfelder and Signoret, 2004).

*Evolution of the Dog*

The domestic dog, *Canis familiaris*, speciated approximately fifteen thousand years ago (Coppinger and Coppinger, 2001). The dog has evolved from its predecessor, arguably *Canis aurens,* the golden jackal, or *Canis lupus,* the wolf, (Serpell, 1995) and has been trained and bred to fit various niches including transport, herding, military and law enforcement, therapy, and house pets. Domesticated dogs are known to outcompete wolves: a sled dog can run farther, a greyhound faster, and a bloodhound has a better olfactory system (Coppinger and Coppinger 2001). Very few books and articles have been written on the biology of dogs (Coppinger and Coppinger 2001), and even fewer on the behavior of the sled dog, particularly in their kennel environment.

Alaskan sled dogs, a group of canines bred from northern breed ancestors to create working dogs to travel over rough Arctic terrain, hauling cargo and humans (Rennick, 1987). They were popular particularly in the late 1800’s and early 1900’s in North America because of exploration and Alaskan gold rush efforts, and acted as transport, protection and companions. (Huson, et al. 2010.) Their popularity decreased after modern modes of off-road transportation were created to make the north more accessible, but again increased in the late 1930’s for sport racing, most notably the Yukon Quest and the Iditarod (Rennick, 1987 and Huson, et al. 2010).

Since the modern increase of interest in sled dogs, a number of kennels are used not only for a way of living and sport, but also for recreation (Yeon, et al. 2001). Kennel capacities can range from a single team to over a hundred dogs. How they are housed and restrained in a kennel poses challenges in health and safety for both owner and dog. Many in the United States use chains and minimal housing. I propose a comparative study of chained and unchained sled dog kennels to test for statistically significant (p<0.05) negative behavior between dogs within kennels that do not use chains versus those that do. I hypothesize that there will be a statistical difference observed, and these results may lead to more of an interest in recreational kennels.

**Review**

The United States federal regulations for housing and care of companion animals (dogs and cats) in indoor and outdoor facilities is developed in the Animal Welfare Act. It also includes research, transportation, and exhibition activities (USDA, 2013). Stress behavior of dogs in kennels has been analyzed and social interest has influenced some change in kennel construction and organization (Protopopova, 2016). Working dog stress behaviors manifest in similar ways, but can be exacerbated in aggression and destruction (Rooney, et al. 2016).

*Federal Facility Regulations*

The United States Animal Welfare Act states that the general housing facilities of a dog or cat must be designed so that they are easy to clean, free of rust, and lack jagged edges to avoid injury (USDA, 2013). All housing must be cleaned daily; housing with dirt flooring, bedding, or similar material must be raked and inspected for contamination (i.e. soiled or infested with insect pests). Waste must be removed and disposed of properly; if disposed near to the animals’ living area, it must be far enough away to avoid odors, disease, pests, and vermin infestation. Food and bedding must be stored at an elevated location in a contained space to avoid contamination and vermin (Mench, 2008; USDA, 2013).

 Indoor housing facilities must be heated and cooled sufficiently to protect dogs and cats from dangerous conditions in extreme weather (Rollin, 1990; McGlone, 2001). The temperature of the facility may not fall below 50°F (10°C) when housing animals not acclimated to cooler temperatures unless allowed by a veterinarian. When they do fall beneath 50°F, dry bedding materials must be provided. Temperatures may not rise above 85°F (29.5°C) for more than four consecutive hours. Ventilation must be provided in indoor facilities and when temperatures are at 85°F and above, auxiliary ventilation, such as fans, must be provided. Lighting in the facility must allow for routine checks (USDA, 2013).

 Outdoor facilities must be made of dogs and cats acclimated and physically adapted for the local climate they reside in. Sick, infirmed, aged, or young dogs and cats must not be sheltered outdoors unless checked and approved by a veterinarian (Rollin, 1990; USDA, 2013). Outdoor facilities must have one or more accessible shelters for each animal, being large enough to accommodate each while sitting, standing, or lying comfortably. The shelter must have four sides, a roof, a floor, and protect them from the cold and heat; and act as a snow, wind, and rain break (McGlone, 2001). At least one shaded spot other than the designated shelter must be available, and sized to accommodate all animals at the same time (Rollin, 1990). All outdoor shelters must be made of material impervious to moisture. Floors must be of an absorbent substrate (e.g. sand, gravel, grass)to prevent odor, disease, and pest infestations. All outdoor shelter surfaces must be maintained regularly (USDA, 2013).

*Positive and Negative Animal Behavior*

Positive behavior is an established desired behavior in a sentient being, while negative behavior is an undesired behavior (Wilson, 1975). Negative behavior includes the destruction of enclosure (e.g. chewing and digging), aggression, or an unsupervised change in hierarchy (Brockett, et al. 1999). Negative behaviors are focused on by trainers and handlers as a workable challenge, each being identified according to their needs (Coppinger and Coppinger 2001).

Aggression is defined by psychologists as behavior exhibited by one organism to destruction or a noxious stimulation on another organism (Moyer, 1976). It can present itself in multiple scenarios in animals: territorial, dominance, sexual, parent-offspring discipline, predatory, and anti-predatory (Wilson, 1975; Moyer, 1976; Drickamer, et al. 2002). Territorial conflicts and aggression stem from the defense of an individual or group’s established space. Dominance behavior is the most aggressive in the initial stages while the organisms are establishing themselves within their social hierarchy (Drickamer, et al. 2002).

Fear and aggression responses stem from situations and stimuli an individual perceives as negative (Drickamer, et al. 2002). These types of startle responses occur when exposed to initial stimuli. As they are increasingly exposed to a stimulus, the startle response may vary. When it increases, it may lead to aggression and other negative behaviors such as destruction. A decrease can result in more typical behavior as opposed to these stress behaviors (Rooney, et al. 2016).

*Shelter Dog Stress Behavior*

 Approximately four million dogs are housed in animal shelters each year. These dogs exhibit high amounts of stress behavior including barking and panting, although dogs generally do bark in confinement (Protopopova, 2016). Stress behaviors can be measured with the number of times a dog exhibits the behavior, such as circling, shaking, and ambivalent postures (Brockett, et al. 1999). Some behaviors exhibited by chronically stressed dogs include high levels of pacing and movement, inactivity, nosing, a raised paw, vocalization, urination, and submissive posture (Hetts, et al. 1992; Clark, et al. 1997). When individual dogs are subjected to relatively high levels of stress this may lead to heightened susceptibility to disease. Therefore, it is best to identify these exhibitions of stress behaviors quickly to curb their stress and possible negative behaviors (Beerda, et al. 1999.)

*Working Dog Stress Behavior*

 Stress behavior and physiology has been studied in shelter and laboratory dogs but not working dogs (Haverbeke, et al. 2007). Since these performance dogs can be used for various activities, their uses vary greatly with human-led work. This can expose them to different environmental stressors including high levels of noise and transportation (i.e. travel for work). It is likely they will be in contact with a variety of humans, other dogs and animals, and their schedule may not be consistent (Rooney, et al. 2016).

Fear and aggression can cause dangerous situations for handlers and trainers, and can inhibit performance in an individual or group of canines (Rooney, N., et al. 2016). Little behavioral research has been conducted on sled dogs (White, et al. 2006). Some previous research suggests that tethered dogs exhibit relatively more stress behavior in small pens than on their chains (Yeon, et al. 2001). However, other evidence indicates that dogs in larger pens exhibit more stress when tethered on chains (White, et al. 2006). Future experimental behavior studies should be conducted on recreational working dogs that shelter on chains or off, with varying sizes of pens to compare results with the studies on sled dogs previously tested. Here I present a study to analyze two kennels that have dogs that live permanently either on chains or in pens.

**Methods**

Two recreational business kennels in Minnesota, one that uses chains (Duluth) and one that does not (Hovland), will be used for this study. The dogs of each kennel will be numbered and then randomly selected using a random number generator (Excel software; Microsoft Corporationm Redmond, WA, U.S.A.). Trail cameras on a tripod will be placed at each kennel to recordall dog behavior in their shelters once a week, from morning feeding to evening feeding, respectively.

The dogs will be observed once an hour for fifteen minutes from 06:00h to 18:00h. During this period, times and descriptions of all stress behaviors will be recorded on a previously established ethogram (Table 1). These behaviors will be counted and comparatively tested for statistically significant differences (p< 0.05) in the presence of negative and stress behaviors between the two kennels. All statistical applications will be conducted R Studio (Rstudio Server Pro, 2016). Any significant differences in behaviors will be further analyzed using Tukey HSD posthoc tests to determine what behaviors are most important for addressing behavioral difference questions in this study.

**Table 1.**  Ethogram of behaviors per hour used in this study. These stress behaviors are used in previous trials in working and shelter dog behaviors (White, et al. 2006; Rooney, 2016).

|  |  |  |
| --- | --- | --- |
| **Behavior** | **Count** | **Comments** |
| ***Circling*** |  |  |
| ***Shaking*** |  |  |
| ***Pacing*** |  |  |
| ***Submissive Posture*** |  |  |
| ***Kennel Destruction*** |  |  |
| ***Growling*** |  |  |

My projected budget includes two trail cameras, donated for use by Antioch College Sciences Division, and gas money ($200) for travel between kennels each week. The trail cameras will decrease travel time and help to capture all behaviors during designated trial times. Travel will start July 10, and end September 22 of 2017. Table 2 outlines the proposed schedule for the study and analysis of the sled dog behavior.

**Table 2.**

A. The months of 2017 dedicated to portions of the study, illustrated with an “x” in the months the activity will occur.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2017** | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| Review |  |  |  | x | x | x |  |  |  | x | x | x |
| Trail CamSet-Up |  |  |  |  |  |  | x |  |  |  |  |  |
| Observe |  |  |  |  |  |  | x | x | x |  |  |  |
| Trail CamTear-Down |  |  |  |  |  |  |  |  | x |  |  |  |
| Travel |  |  |  |  |  |  | x | x | x |  |  |  |
| Analysis |  |  |  |  |  |  |  |  |  | x | x | x |

**Significance of Study**

The use of dogs for eco-tourism has increased in the last century. Sled dogs are bred and used for sport and work in industry, but very few behavioral studies have been conducted (Coopinger and Coopinger, 2001). Stress has been found to occur in tethered domesticated species, although in one previous study on sled dog behavior, repetitive stress behaviors increased when the dogs were moved into small pens (Yeon, et al. 2001). Another study stated the exact opposite, that dogs exhibit more repetitive stress behaviors in long-term living environments (White, et al. 2006). The study I propose would focus on two kennels with a long-term arrangement of either chained or penned living. The results of this study can be used to recommend not only future legislature but also new kennel establishments and design.

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